

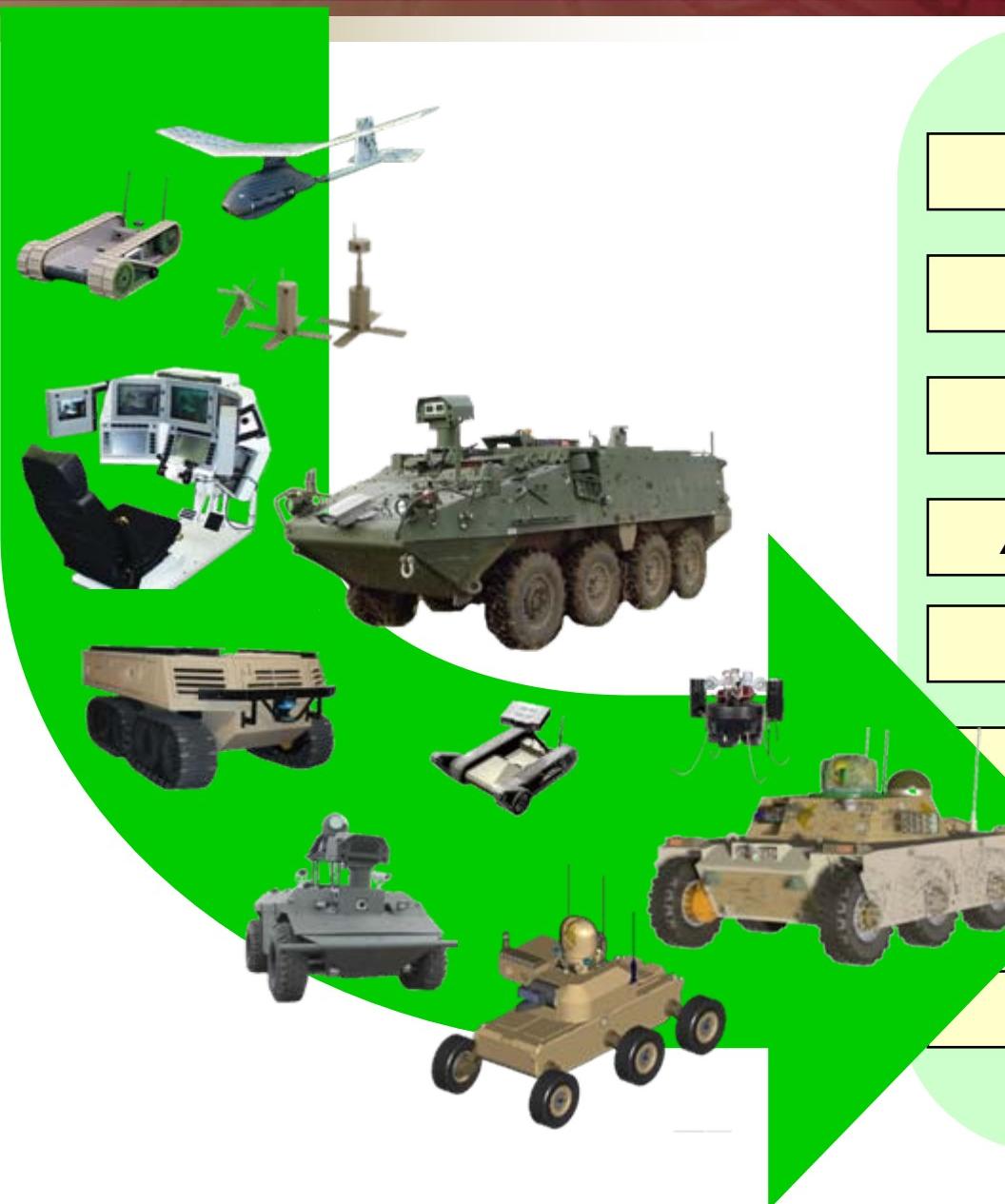
Embedded Simulation Overview

Presented by Scott Lohrer

4/10/2008

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Solving Tomorrow's Challenges Today



Teleoperation

Protection

Safe Operations

Bandwidth

Power & Energy

Planning

Classification

Affordability

Latency

Convoy

Weaponization

Behaviors

Sensing

OCU

Mobility

Resolution

Interoperability

Payloads

Embedded Simulation

Embedded Simulation System Capabilities

- **HLA and DIS compliant**
 - RPR and MATREX FOM
 - DREN connection
 - Classified DVL
- **Man-in-the-loop desktop or SIL**
- **Create a manned vehicle that can control n number of unmanned assets**
 - UGV, UAV, UGS
- **Sub system simulation**
 - Mobility, sensor, lethality, survivability
- **SOSCOE interface**
 - Integrate with real hardware
- **Live/Virtual mix**
 - Real vehicle with simulated sensor and weapon
 - Mission planning and rehearsal capability

Man-in-the-Loop



Embedded Simulation Technologies

Warfighter machine interfaces (WMI)

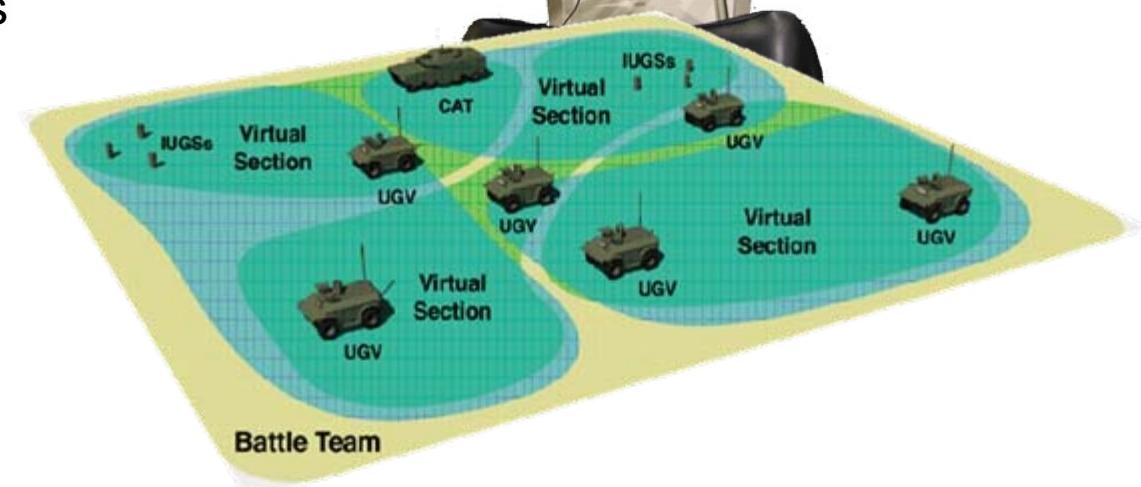


Human Performance Modeling

Modeling of human workload issues

Distributed Simulation Activities

Virtual battlefield simulations



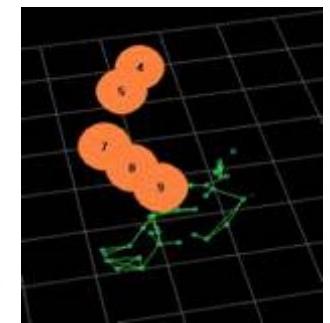
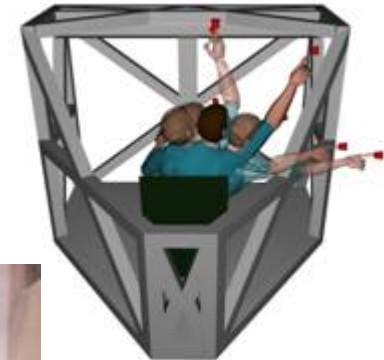
Human Performance

Workload Related Issues

Soldier Performance Investigations

Human Performance Modeling

Crew Workload



Vehicle Dynamics Modeling

Predict 3-D dynamic response of vehicle systems

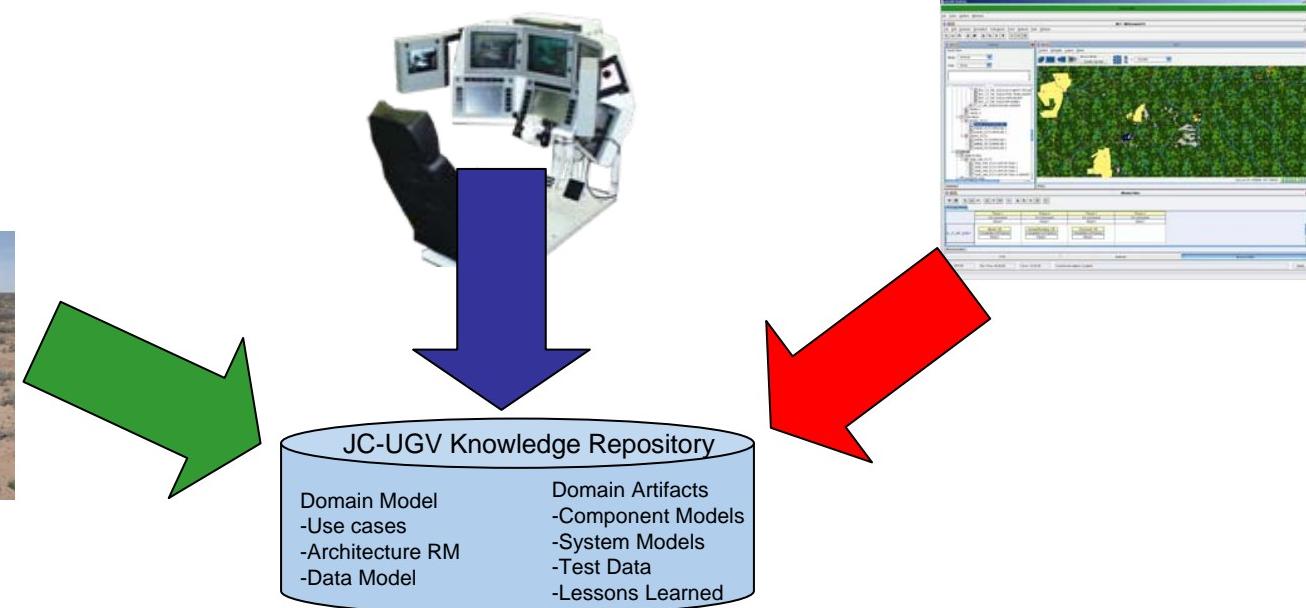
- **vehicle steering, handling, stability, rollover, slope performance...**

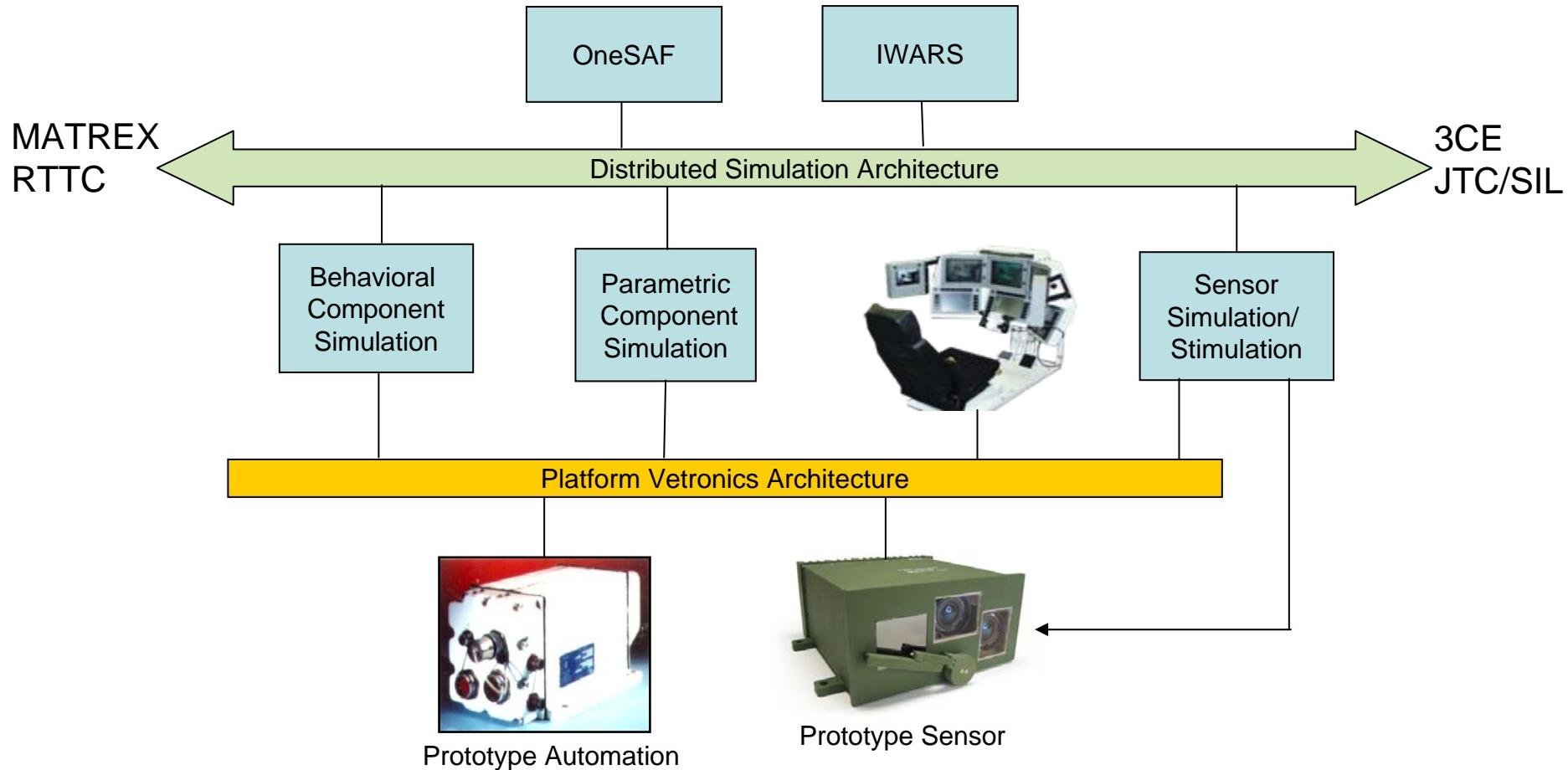
Quantify benefits of tech-insertions or impacts due to configuration changes

- **Identify safe limits of operation**
- **Evaluate field mishaps/accidents**



JC-UGV SIL

Live**Virtual****Constructive**



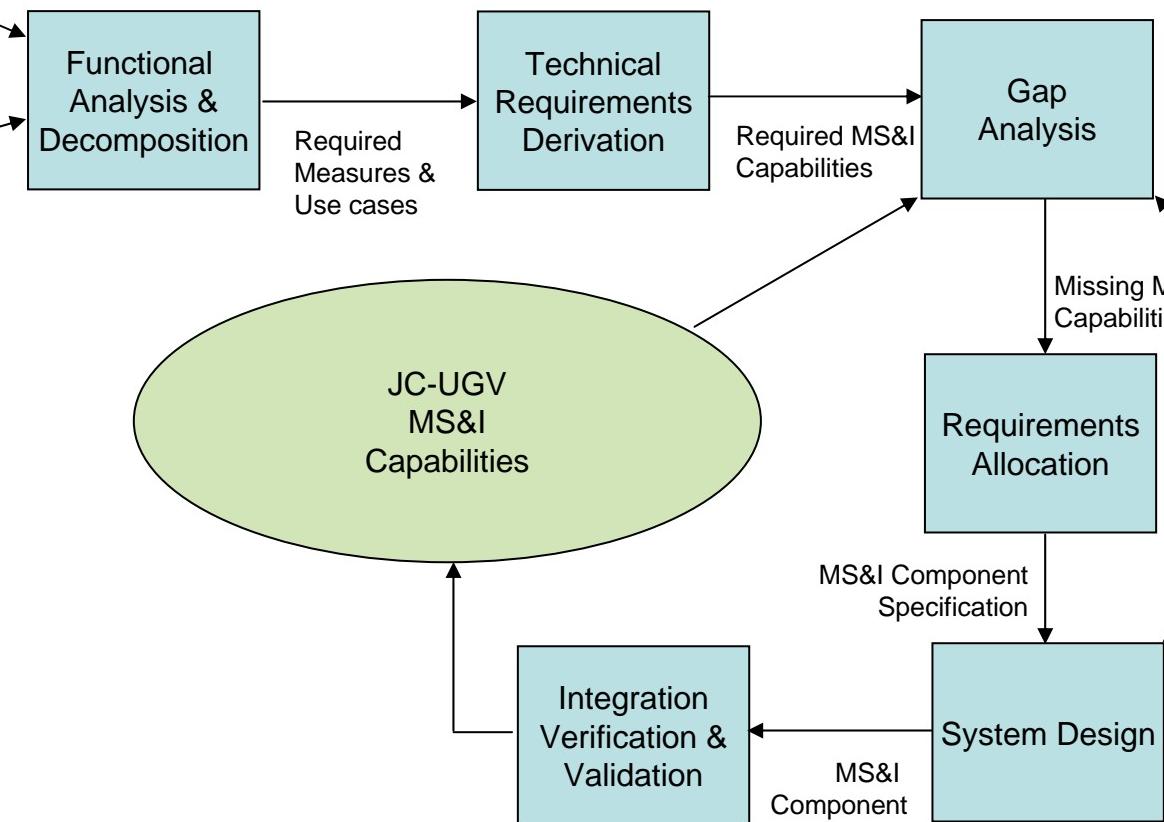
Integration of platform and modeling architectures supports interoperation of prototyped and simulated components

JC-UGV MS&I SIL Mid/Long Range Capability Development Process



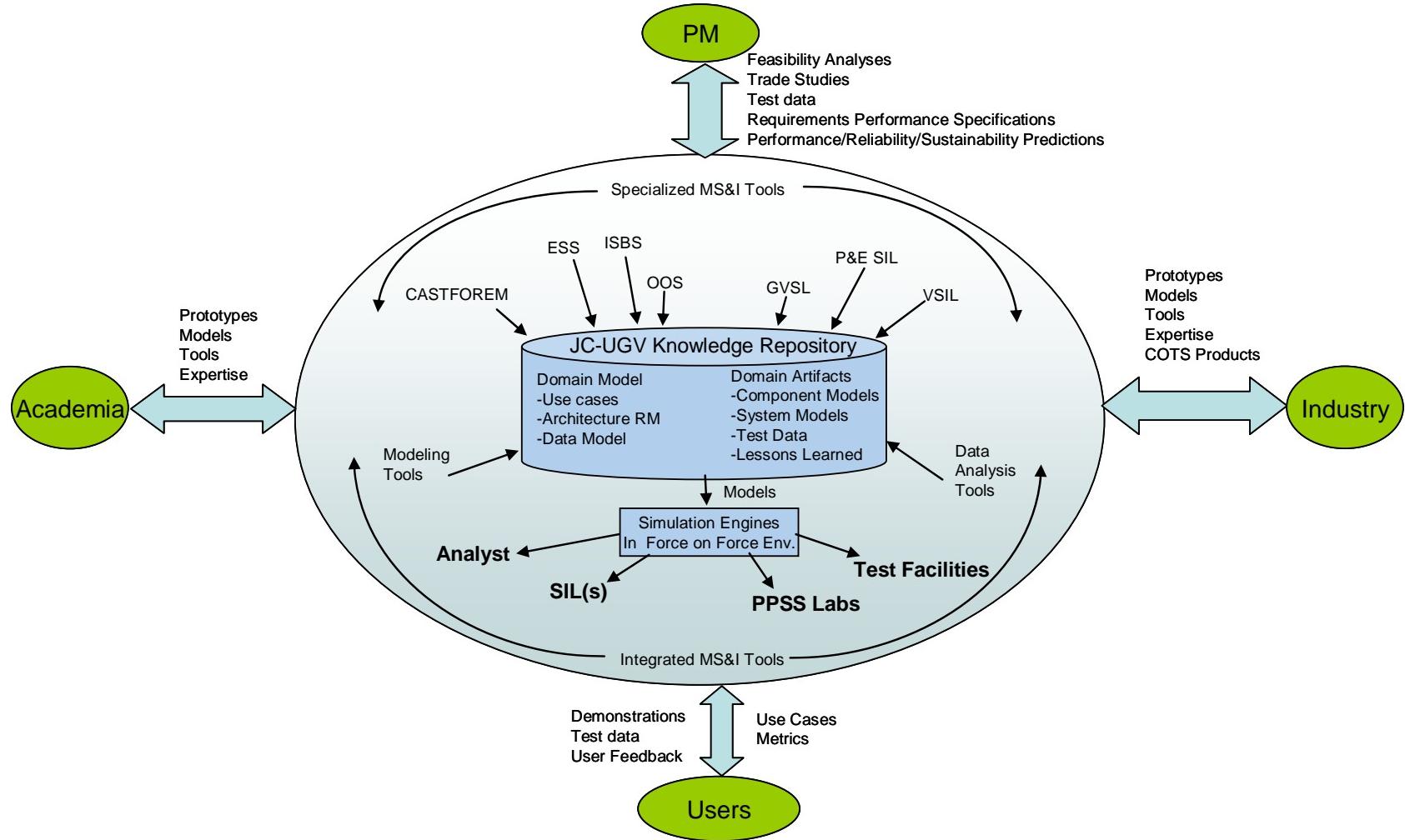
JC-UGV
MS&I
Capabilities

Army
MS&I
Capabilities



Back up slides

JC-UGV Modeling, Simulation, and Integration Environment



TARDEC UGV Safe Ops Effort



Maturing UGV Safe Operations Technology through Integration and Test



Detect, track, and avoid humans



Dismounted forces safety



Maintain lane among civilian traffic



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011011
011010**

Integrating FCS representative technologies

Integration:

- Gen 5 Autonomous Navigation System (ANS)
- Tactical Autonomous Combat – Chassis (TAC-C)
- ARL R-CTA developed algorithms

Test & Experimentation:

- Address FCS Risk UGV0213
- MULE & ARV relevant scenarios

- Directly address risks associated with employing UGVs in dynamic environments.
- Identify additional risk areas of operating UGVs around moving traffic, pedestrians, and dismounted forces.